

Low-power, Confocal Imaging of Protein Localization in Living Cells (7215-010), Phase II

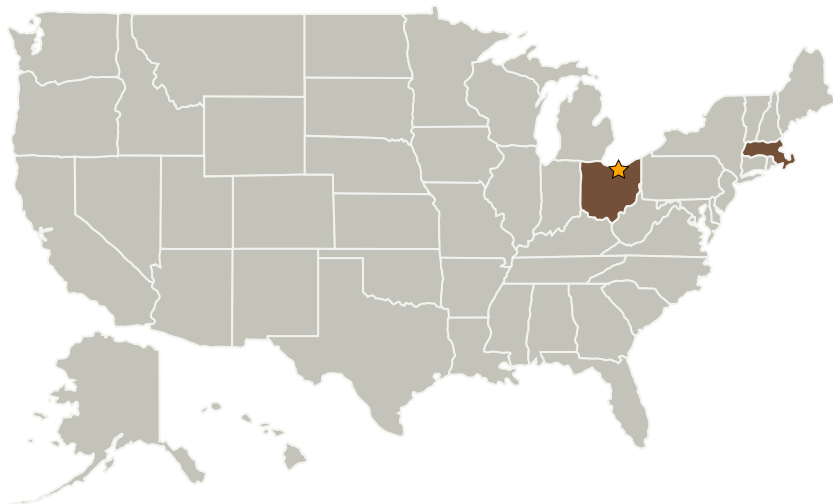
Completed Technology Project (2004 - 2006)



Project Introduction

The proposed innovative technology addresses the need to understand and develop countermeasures for the skeletal and cardiovascular changes to astronauts during prolonged exposure to microgravity environments. During the proposed program we will apply our innovative functional imagery approach, developed in Phase I research, to the problem of microgravity-induced cellular changes in osteoblasts, cells that are responsible for bone growth and repair. As part of the program we will develop a 593-nm diode-pumped, solid-state (DPSS) laser that will be combined with a commercially available 473 nm DPSS laser to enable simultaneous visualization of three cellular proteins that are genetically fused to fluorescent reef coral proteins (RCFPs). The genetic constructs we will generate, integrin α V-ZsGreen, p130CAS-DsRed2 and HcRed- α -actin, will enable space biologists to monitor changes in cytoskeletal structure as well as changes at the focal adhesions in vivo and in real time with no manipulation or reagent addition. Those same genetic constructs could be expressed in different cell lines to examine the effects of microgravity environments on cardiovascular tissue. We expect that the improved understanding of cellular changes that our innovative model system will deliver will enable rapid development of countermeasures to microgravity-induced changes in humans.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations

Massachusetts	Ohio
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.5 Structural Dynamics
 - └ TX12.5.1 Loads and Vibration